

wherein the readout control circuit and the array controller are configured to simultaneously read out values for a group of pixel elements within a first portion of the array, including at least two pixel elements from two different rows and two pixel elements from two different columns and to reconstruct color components for at least a first pixel sensor element and a second pixel sensor element using color information from other pixels elements within at least the first portion of the array while the readout control circuit is reading said first portion of the array.

2. (As originally filed) The system of Claim 1, further comprising:

a comparator circuit adapted to compare an address of a pixel sensor element currently being read by the readout control circuit with a stored list of defective pixel sensor addresses; and

at least one delay element for storing at least one previous analog pixel value read by the readout control circuit, wherein if the address of the current pixel sensor element matches a defective pixel address in the stored list, the readout control circuit reads the previous analog pixel value.

3. (Amended) The system of Claim 1, wherein the readout control circuit is adapted to perform color interpolation using two pixel sensor elements read out in parallel.

4. (As originally filed) The system of Claim 1, further comprising:

a first analog line storage unit, the first analog line storage unit being adapted to store a first line readout from the array; and

a second analog line storage unit, the second analog line storage unit being adapted to store a third line readout from the array, wherein the readout control circuit averages a second consecutive line readout from the array with the first line readout stored in the first analog line storage unit to produce a first red-green-blue (RGB) triplet, the readout control circuit averaging a fourth consecutive line readout from the array with the third line readout stored in the second analog line storage unit to produce a second RGB triplet.

5. (As originally filed) The system of Claim 4, wherein the analog storage units are capacitors.

6. (Amended) The system of Claim 1, wherein the readout control circuit is programmable to read a first set of pixel elements in a first user controlled mode of operating the

imaging system and to read a second set of pixel elements in a second user controlled mode of operating the imaging system.

7. (As originally filed) The system of Claim 1, wherein the pixel sensor elements form a portion of a charge coupled device.

8. (As originally filed) The system of Claim 1, wherein the pixel sensor elements form a portion of a complementary metal oxide semiconductor device.

9. (Amended) The system of Claim 1, further comprising;

a first programmable gain amplifier adapted to amplify a first color readout signal a first amount; a second programmable gain amplifier adapted to amplify a second color readout signal a second amount; and

a summing circuit coupled to the first programmable gain amplifier and the second programmable gain amplifier.

10. (As originally filed) The system of Claim 9, wherein the programmable gain amplifiers are implemented as a separate stage.

11. (As originally filed) The system of Claim 9, wherein the programmable gain amplifiers are contained within a pixel circuitry of the array.

12. (As originally filed) The system of Claim 9, wherein the programmable gain amplifiers are within a plurality of column buffers.

13. (Amended) The system of Claim 9, wherein the programmable gain amplifiers have different transfer functions, including different corresponding exponent values.

14. (As originally filed) The system of Claim 1, wherein at least a portion of the pixel sensor elements are active.

15. (As originally filed) The system of Claim 1, wherein at least a portion of the pixel sensor elements are passive.

16. (Amended) The system of Claim 1, wherein at least the first pixel sensor element is associated with a different color filter component than a neighboring pixel sensor element.

17. (As originally filed) The system of Claim 1, wherein the predefined pattern is a Bayer color configuration.

18. (As originally filed) The system of Claim 1, wherein the predefined pattern comprises the colors of red, blue and green.

19. (As originally filed) The system of Claim 1, wherein the predefined pattern comprises the colors of yellow, cyan and magenta.

20. (As originally filed) The system of Claim 1, further comprising a micro-lenses layer.

21. (Amended) The system of Claim 1, wherein the readout control circuit and the array controller read out a first set of pixel sensor elements and then readout a second set of pixel sensor elements, such that the second set of pixel sensor elements only partly overlaps a portion of the first set of pixel sensor elements.

22. (As originally filed) The system of Claim 1, wherein the readout control circuit and the array controller process a first set of pixel sensor elements and then process a second set of pixel sensor elements, such that the second set of pixel sensor elements does not overlap the first set of pixel sensor elements.

23. (As originally filed) The system of Claim 1, wherein the readout control circuit and the array controller process a first set of pixel sensor elements, skip a second set of pixel sensor elements and process a third set of pixel sensor elements.

24. (As originally filed) The system of Claim 1, wherein the readout control circuit and the array controller only processes a sub-region of the array of pixel sensor elements.

25. (As originally filed) The system of Claim 1, further comprising a television coupled to said readout control circuit.

26. (As originally filed) The system of Claim 1, further comprising a personal computer coupled to said readout control circuit.

27. (As originally filed) The system of Claim 1, further comprising a monitor coupled to said readout control circuit.

28. (As originally filed) The system of Claim 1, further comprising a camera coupled to said readout control circuit.

29. (Amended) A method of interpolating color components of an array of pixel sensor elements, said method comprising:

reading a first rectangular portion of an array of pixel sensor elements simultaneously, wherein the first rectangular portion includes pixel sensor elements from at least two array columns and two array rows;

reading a second rectangular portion of the array of pixel sensor elements, wherein the second portion partly overlaps said first portion; and

reconstructing color components using interpolation for at least a third portion of the array while said third portion of the array is being read.

30. (As originally filed) The method of Claim 29, further comprising:

comparing an address of a pixel sensor element currently being read by a readout control circuit with a stored list of defective pixel sensor addresses; and

storing at least one previous analog pixel value read by the readout control circuit, wherein if the address of the current pixel sensor element matches a defective pixel address in the stored list, the readout control circuit reads the previous analog pixel value.

31. (Amended) The method of Claim 29, wherein reconstructing color components using interpolation is performed in real-time.

32. (Amended) The method of Claim 29, wherein reconstructing color components using interpolation is performed in an analog domain.

33. (Amended) The method of Claim 29, wherein the overlapped portion is used to interpolate color components in both the first rectangular portion and the second rectangular portion of pixel sensor elements.

34. (Amended) The method of Claim 29, further comprising reading a fourth portion of pixel sensor elements and then reading a fifth portion of pixel sensor elements, such that the fourth portion of pixel sensor elements does not overlap the fifth portion of pixel sensor elements.

35. (Amended) The method of Claim 29, wherein the act of reading includes reading a first set of pixel sensor elements in an array row, skipping a second set of pixel sensor elements in the array row and reading a third set of pixel sensor elements in the array row, the method further comprising:

summing a plurality of pixel sensor value readouts associated with a corresponding plurality of pixel sensor elements associated with a first color to produce a first color component corresponding to a first skipped pixel sensor element; and

summing a plurality of values associated with a plurality of pixel sensor elements associated with a second color to produce a second color component corresponding to a second skipped pixel sensor element.

36. (Amended) The method of Claim 34, further comprising:

summing a plurality of pixel sensor value readouts associated with a corresponding plurality of pixel sensor elements associated with a first color to produce a first color component; and

summing a plurality of values associated with a plurality of pixel sensor elements associated with a second color to produce a second color component.

37. (As originally filed) The method of Claim 29, wherein the act of reading includes reading only a sub-region of the array of pixel sensor elements.

38. (Amended) A color imager comprising:

a first light sensor which generates a first analog output signal related to the amount of a first color of light sensed;

a second light sensor which generates a second analog output signal related to the amount of said first color of light sensed;

a third light sensor which generates a third analog output signal related to the amount of a second color of light sensed;

a fourth light sensor which generates a fourth analog output signal related to the amount of a third color of light sensed;

a circuit configured to read out the first, second, third and fourth analog values at the same time; and

an interpolation circuit configured to receive said first output signal and said second output signal, wherein said interpolation circuit provides an interpolation signal on the fly based on at least said first analog output signal and said second analog output signal.

39. (Amended) A method of interpolating a color value in the analog domain in real-time, comprising:

receiving a first analog signal corresponding to the output of a first pixel element in an imager, the first pixel element used to sense light intensity of a first color;

receiving a second analog signal corresponding to the output of a second pixel element in the imager, the second element spaced from the first pixel element, wherein the second pixel element is used to sense light intensity of the first color;

receiving a third analog signal corresponding to the output of a third pixel element in the imager at the same time as the first and second analog signal, the third element in a